

however, both the SAT and ACT have shown stable or slightly increasing standard deviations.^{4/} The standard deviation of scores on the ITBS has also been increasing.^{5/} Between the 1970 and 1977 school years, the standard deviations of the SRA achievement series showed different changes, depending on subject area and grade. In general, they tended to increase in the younger grades but decrease in the higher grades.^{6/} Given known problems in obtaining truly representative norming samples for such tests in different years, however, as well as changes in the representativeness of the samples over time, changes in the standard deviations of norming data should perhaps be given less weight than those in the other data sources.^{7/}

TRENDS AMONG COLLEGE-BOUND STUDENTS

Much of the public awareness of the achievement decline stems from the decline in SAT scores. But students taking college admissions tests (the SAT and ACT) and those planning to attend four-year colleges constitute only roughly half of the senior class, and their average level of achievement is above the overall average.^{8/} Thus, it is important to gauge whether

4. The College Board, *College-Bound Seniors, 1984*; and American College Testing Program, unpublished tabulations.
5. H. D. Hoover, Iowa Testing Programs, personal communication, March 1984.
6. Science Research Associates, *SRA Achievement Series, Technical Report #3*, Table 2.
7. With respect to the problems in norming samples for such tests, see Roger F. Baglin, "Does 'Nationally' Normed Really Mean Nationally?" *Journal of Educational Measurement*, vol. 18 (Summer 1981), pp. 97-108; and Science Research Associates, *SRA Achievement Series, Technical Report #3*.
8. The group taking college-admissions tests and those entering college are not entirely the same, since not all college-bound students take the tests. In 1984, about 28 percent of those students graduating (excluding those obtaining high-school equivalency credentials) took the ACT, and 37 percent took the SAT. Those groups overlap to some unknown degree, however, so the proportion taking one or the other is less than the sum. The proportion taking such tests was lower during the early years of the decline. Similarly, 46 percent of all seniors in the class of 1980 (a larger group than all graduates, because of senior-year drop-outs) planned to attend at least four-year colleges. See The College Entrance Examination Board, *National College-Bound Seniors, 1985* (New York: The College Board, 1985); American College Testing Program, *Executive Summary: National ACT Assessment Results, 1984-1985* (Iowa City: ACT, 1985); National Center for Education Statistics, *Projections of Education Statistics to 1990-91* (Washington, D.C.: NCES, 1982); and Donald A. Rock, Ruth B. Eckstrom, Margaret E. Goertz, Thomas L. Hilton, and Judith Pollack, *Factors Associated with Decline of Test Scores of High School Seniors, 1972 to 1980* (Washington, D.C.: Center for Statistics, U.S. Department of Education, 1985).

trends on college-admissions tests are indicative of comparable trends among high-school seniors in general and, if not, whether differences reflect different trends among college-bound achievement subgroups or some other factors.

A difference between the trends shown by college admissions tests and tests given to all students need not indicate that achievement trends in the relatively high-achieving group of students taking the test are different from those in other achievement subgroups. A difference in score trends could also reflect changes in the self-selection of students taking the tests, or differences between the tests themselves and other tests administered to the student body as a whole.

As noted in Chapter IV, the decline in average scores on both the SAT and ACT were exacerbated by changes in the self-selection of students choosing to take the tests. In the case of the SAT, research suggests that over half of the decline between 1963 and 1970, but relatively little of it since then, reflected changes in the composition of the group taking the test.^{9/} Thus, in one sense, both the SAT and the ACT exaggerate the decline, in that the drop in average scores would have been substantially less if the test-taking group had remained constant or had changed only as the entire school-age population changed. (The research on this issue is described in CBO's forthcoming volume, *Educational Achievement: Explanations and Implications of Recent Trends*.)

This exaggeration of the decline, however, does not imply a greater drop in achievement among the relatively high-scoring achievement subgroups that tend to take these tests. A larger real decline in that group would be indicated if the decline on the SAT were larger than that on tests given to all high-school seniors, even after removing the influence of self-selection changes and accounting for differences between the tests. No existing studies, however, fully clarify whether there would be a greater decline on the SAT under those conditions, in part because there is not sufficient information to adjust for differences between the tests.^{10/}

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9. Advisory Panel on the Scholastic Aptitude Test Score Decline, *On Further Examination* (New York: The College Board, 1977), p. 18.
 10. In this context, one would want either confirmation that the tests involved would show similar trends if administered to the same students, or sufficient information to adjust the trends from one test to parallel those that would be produced by the other. Although equating studies that permit comparison of scores among tests at any one time are common, similar studies that permit comparisons of trends are largely lacking. Thus, as noted in Chapter III, much of the variation in trends among tests cited in this paper remains unexplained.

The available evidence, while not fully conclusive, does not suggest that the achievement decline was sharper among college-bound students than in the student population as a whole. Indeed, the decline might have been less severe in some college-bound groups during the early years of the decline. One study that directly compared trends in reading achievement among all seniors, college entrants, and SAT candidates between 1960 and 1972 found that the scores of college entrants, unlike those of SAT candidates, dropped only approximately as much as those of all seniors.^{11/} Since the college-bound population was also becoming less select during this period, the similarity might indicate that the average scores of some groups that traditionally sent many students to college were declining less than others, thereby offsetting the effects of the growing number of lower-achieving students going to college. ^{12/}

For the years since 1972--the larger part of the period of decline on the SAT--there is no evidence that trends among college-bound students as a whole differed substantially in either direction from those among all seniors. In the nationally representative comparison of the NLS and HSB, seniors stating that they planned to attend four-year colleges or graduate schools showed declines in vocabulary, reading, and mathematics roughly comparable to those of the whole senior class.^{13/} Comparisons of trends on a variety of tests administered to juniors and seniors show some trends in the general student body that are more favorable than those on the SAT and ACT but others that are less favorable. Moreover, the trends on the SAT and ACT are inconsistent with each other (see, for example, Table III-2 in Chapter III). Given this inconsistency and the unexplained variation in trends among tests, disparities between the ACT and SAT and any given test administered to the student population as a whole could be reasonably attributed to differences in test characteristics rather than to variations in trends among achievement subgroups.

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11. Albert E. Beaton, Thomas L. Hilton, and William B. Schrader, *Changes in the Verbal Abilities of High School Seniors, College Entrants, and SAT Candidates Between 1960-1970* (New York: The College Board, 1977).
 12. Advisory Panel on the Scholastic Aptitude Test Score Decline, *On Further Examination*, pp. 13-16. Note that the SAT candidate group underwent changes in composition beyond those affecting the college-bound group as a whole, reflecting a change in the proportion and characteristics of those college-bound students taking the SAT.
 13. Donald Rock and others, *Factors Associated with Decline of Test Scores*.

SELECT STUDENTS

Because recent trends in the National Assessment have been relatively unfavorable among the top quartile of students, some people might assume that select students, variously defined, have also lost ground relative to other students.^{14/} This seems not to be the case, however. While some data show comparatively steep declines among select students, the available data as a whole do not, and the recent upturn appears to have been, if anything, particularly striking among some select groups. In addition, in mathematics--an area of particular public concern in recent years--select students might have been gaining ground for a considerable time.

Reports of trends among select students vary markedly, however. Some show greater declines than among other groups, while others show less marked declines or even no decline at all. This variation probably reflects the diversity both in criteria used to delineate select students and in the tests administered to them, as well as the sparseness of the available data. For example, the groups chosen to represent the select include: students scoring above specified thresholds on the SAT; students taking more selective tests, such as the College Board achievement and advanced placement tests; students in the highest ranks of their classes; and students taking certain advanced courses (such as high school calculus).

In addition, limitations of the data seriously cloud comparisons between select students and others. Only a few tests have been tabulated in a way that permits direct comparison of select and other students.^{15/} Those that are directly comparable are limited to high school students or, more narrowly, to college-bound juniors and seniors. Moreover, many of the tests that are designed intentionally for select students--such as the College Board achievement and advanced placement tests--are optional, and there is only limited information about the effects of changes in the test-taking groups on average scores. For example, the proportion of students taking

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14. Reports of trends among these students have used a variety of terms to label them. "Select students" is used here as a generic term for various groups of the highest-achieving students.
 15. Scores on many tests could be tabulated to permit such a comparison, subject to the limitations that small sample sizes and problems of scaling often would impose on how select a group could be assessed with confidence. Such reanalysis of the data at the level of individual students, however, is beyond the scope of this paper.

advanced placement tests has changed dramatically in recent years, as has their geographical distribution and the colleges they subsequently attend.

The SAT

Perhaps the most commonly cited evidence of declining achievement among select students is the drop in the proportion of SAT candidates receiving very high scores. For example, the proportion receiving scores over 700 dropped sharply between 1966 and 1980, particularly on the verbal test (see Figure D-1). In 1966, roughly 2.5 percent of SAT candidates obtained verbal scores in excess of 700; that percentage had dropped to about 0.8 percent 15 years later. The drop was both more erratic and less severe on the mathematics test--from roughly 4.1 percent to 2.7 percent. (This parallels the fact that the drop in the mean score was much smaller on the mathematics test; see Chapter 3, Figure III-4.) A tabulation of this sort, however, cannot be compared directly with the overall decline, which is usually measured in terms of changes in the average scores themselves.

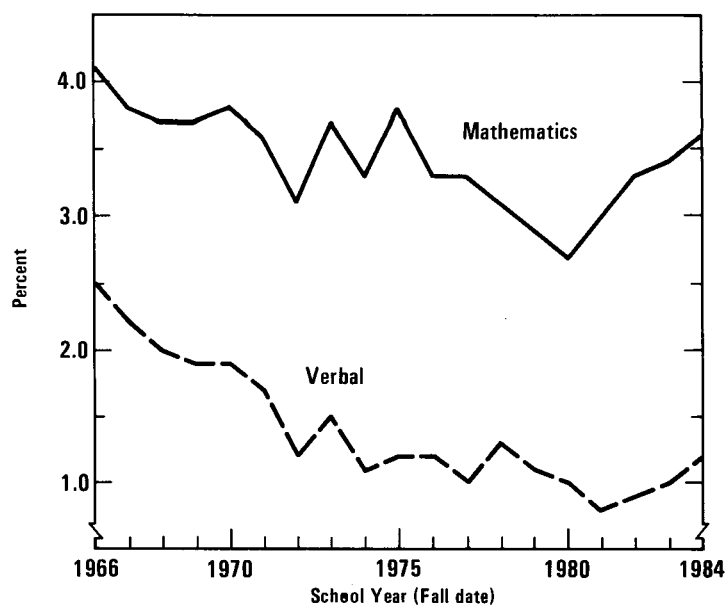
Trends in the proportion of candidates receiving high SAT scores also provide clear evidence that the recent upturn has been particularly sharp among some select students, at least in mathematics. The proportion of SAT-M scores over 700, for example, has risen roughly two-thirds of the way to its 1966 high level, even though it has been rising for only four years (see Figure D-1). The corresponding increase in the proportion of verbal scores over 700, however, has shown far less improvement.

Two other tabulations of SAT scores that are more directly comparable to common measures of the overall decline yield apparently--but perhaps not truly--contradictory information on the relative trends among select students. Both tabulations examine changes in the average scores of various select groups--rather than the number of students scoring above certain thresholds--but they use different criteria for categorizing students as select and encompass different time periods.

The first of these tabulations of select SAT scores indicates that from 1966 to 1975--a period that encompasses the worst of the SAT decline--average scores on the mathematics test declined somewhat less among the high-scoring than among lower-scoring SAT candidates (see Figure D-2). The average score at the 90th percentile declined the least, and scores at the 75th and 50th percentiles dropped substantially less than scores at lower percentiles. Only in the mid-1970s, however, did the top-scoring group show a different trend than that of the median SAT candidate. Moreover, no

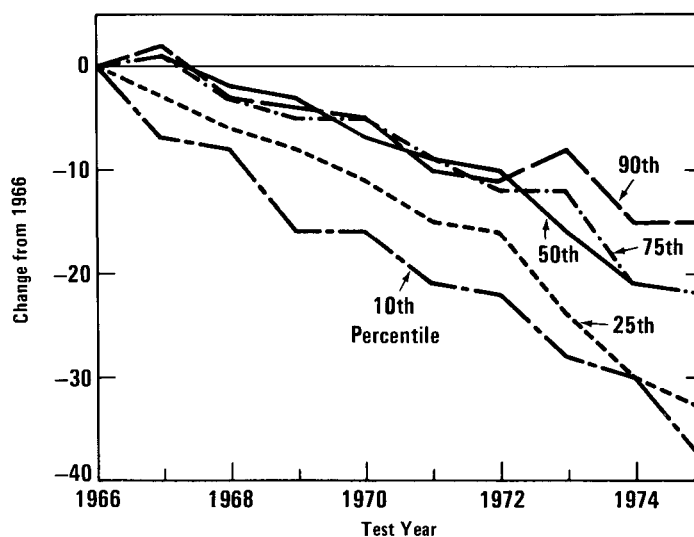


Figure D-1.
Percent of SAT
Scores Above 700
(By subject)



SOURCES: CBO calculations based on Hunter M. Breland, *The SAT Score Decline: A Summary of Related Research* (New York: The College Board, 1976); and the College Entrance Examination Board, *National College-Bound Seniors* (New York: The College Board, various years).

Figure D-2.
SAT Mathematics
Scores for Selected
Percentiles
(Differences
from 1966)



SOURCE: CBO calculations based on June Stern, *Selected Percentiles for Scholastic Aptitude Test Scores (1966-67 through 1975-76)* (New York: College Entrance Examination Board, 1977).

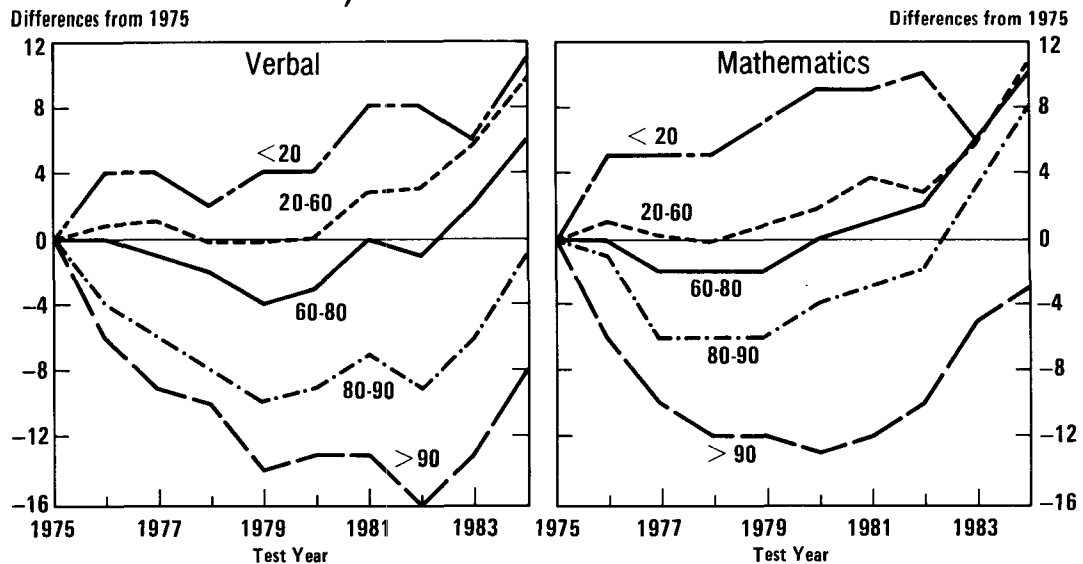
similar differentiation appeared on the verbal scale.^{16/} Unfortunately, no comparable tabulation of SAT scores is available for years after 1975.

The second tabulation, which only began in 1975 and in which select students were included on the basis of self-reported class rank rather than SAT scores, shows virtually the opposite pattern: more select groups lost ground on the SAT verbal test relative to other students (see Figure D-3).^{17/} This trend was apparent both during the last years of the decline and during the first few years of the subsequent upturn. In contrast, since 1982, the gap between the various groups has largely remained constant. Indeed, this pattern was not limited to select students; across the entire range, students with higher class rank showed less favorable trends than did students with lower class rank.^{18/} Scores of students reporting themselves to be above the 90th percentile in class rank fell 16 points on the SAT-V between the 1975 and 1982 school years and only began turning up in 1983. The pattern among students between the 80th and 90th percentiles is quite similar, but the decline is four points smaller, and the subsequent upturn is clearer and might have begun a few years earlier. In contrast, the average scores of the broad middle of students--those falling between the 20th and 80th percentiles in class rank--showed at most a small drop between 1975 and 1979 and have been rising quite steadily since.

While less favorable trends appeared among students with higher class ranks on the SAT mathematics scale as well, the mathematics trends differed in some respects (see Figure D-3). As in the case of the verbal scale, the widening gap between achievement groups was quite consistent across the entire range of achievement levels, and the upturn began consistently earlier in lower-ranked groups of students. In the case of mathematics, however, the widening of the gap between high- and low-achieving groups had ended before the overall rise in scores began in 1981, and, indeed, the top 10 percent of students gained a bit relative to others during the first years of the score increase.

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16. June Stern, *Selected Percentiles for Scholastic Aptitude Test Scores (1966-67 through 1975-76)* (New York: The College Board, 1977).
 17. William W. Turnbull, *Changes in SAT Scores: What Can They Teach Us?* (College Board-ETS Joint Staff Research and Development Committee, forthcoming), Table II.
 18. Although the trend among students below the 20th percentile is largely consistent with this generalization, it cannot be interpreted with confidence, for it reflects very few students--only 0.6 percent of SAT candidates in the 1983-1984 school year.

Figure D-3.
SAT Scores by Percentile of Class Rank (By subject,
differences from 1975)



SOURCE: CBO calculations based on the College Entrance Examination Board, *National College-Bound Seniors* (New York: The College Board, various years).

Is the apparently steeper SAT decline after 1975 among students with high class ranks inconsistent with the comparable or even lesser declines of students with high SAT scores in earlier years? Not necessarily. The mathematics trends suggest that the upturn might have begun earlier among lower-achieving students. If so, it could cause an apparently greater decline among select students during the last few years of the decline even if select students showed comparable or lesser drops over the entire period of the decline. In addition, select students might have declined less on the SAT during the earlier and middle years of the decline but more at its end—a pattern that could easily arise if the trends reflect a variety of different causes. Alternatively, class rank and SAT percentiles might delineate different select groups that experienced different trends throughout the decline. This possibility is strengthened by the fact that class rank, unlike SAT percentiles, is based on self-reports by students and is therefore subject not only to random error, but also to systematic differences in response bias among different groups of students. Finally, changes in grading criteria or students' choices of classes might have altered the meaning of class rank. Those students currently ranking in the top 10 percent, for example, might be dissimilar in some respects from those with comparable ranks in 1975.

The SAT trends among students divided by class rank also fail to show the sharp relative gains in mathematics scores among select students evidenced by the dramatic rise in SAT-M scores above 700, but this discrepancy might also be more apparent than real. The difference suggests that the atypically sharp rise in mathematics achievement is limited to a more select group of students than those reporting themselves in the top 10 percent of their classes. Students scoring over 700 are far fewer in number than those reporting themselves to be in the top 10 percentile of class ranks; even after the recent increases, only 3.6 percent of SAT candidates are in the former group, compared with 21.1 percent in the latter.^{19/} The former group also presumably comprises students who are more select in terms of their coursework in mathematics.

The Illinois Decade Study

This study suggests that the decline among select students was no worse, and perhaps slightly less severe, than that among other students. The decline among students at the 95th percentile (that is, those at the cutoff for the top 5 percent) was generally similar to that of students at the 75th and 50th percentiles, with one exception: on one of two mathematics tests, those students at the 95th percentile showed almost no decline.^{20/}

The Iowa Test of Basic Skills

National norming data from the ITBS show scores of eighth-grade students at the 90th percentile declining considerably less than scores of the median student between 1970 and 1977--a period that includes the first year of the upturn. On this test, unlike some of the others described here, the relative gains of the select students were greater in language-related areas than in mathematics.^{21/}

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19. The College Board, *National College-Bound Seniors (1985)*, Tables 1 and 7.
 20. On that particular math test, the lowest-scoring students (in this case, those at the 25th percentile) declined by as little as those at the 95th percentile in absolute terms, while those students falling in between declined substantially more. Illinois State Board of Education, *Student Achievement in Illinois*, p. 10.
 21. Hieronymus, Linquist, and Hoover, *Iowa Test of Basic Skills: Manual for School Administrators*, Table 6.24. Similar patterns were apparent at many of the other grade levels as well, but their interpretation is less clear, since the differences at younger ages included more of the period of increasing scores.

The Second International Assessment of Mathematics

A recent international assessment of mathematics achievement suggests that select American students--in this case, those taking calculus while in high school--have improved in mathematics. This assessment, carried out in 1981-1982 in a national sample of American schools, included testing of seniors in calculus and pre-calculus classes--together, about 10 percent to 12 percent of seniors. The performance of this group was slightly superior to that of comparable students in a similar international assessment 17 years earlier (based on items included in both assessments), although it was still quite poor by international standards. This improvement appears to have been far stronger among the students in the calculus classes. 22/

The College Board Achievement Tests

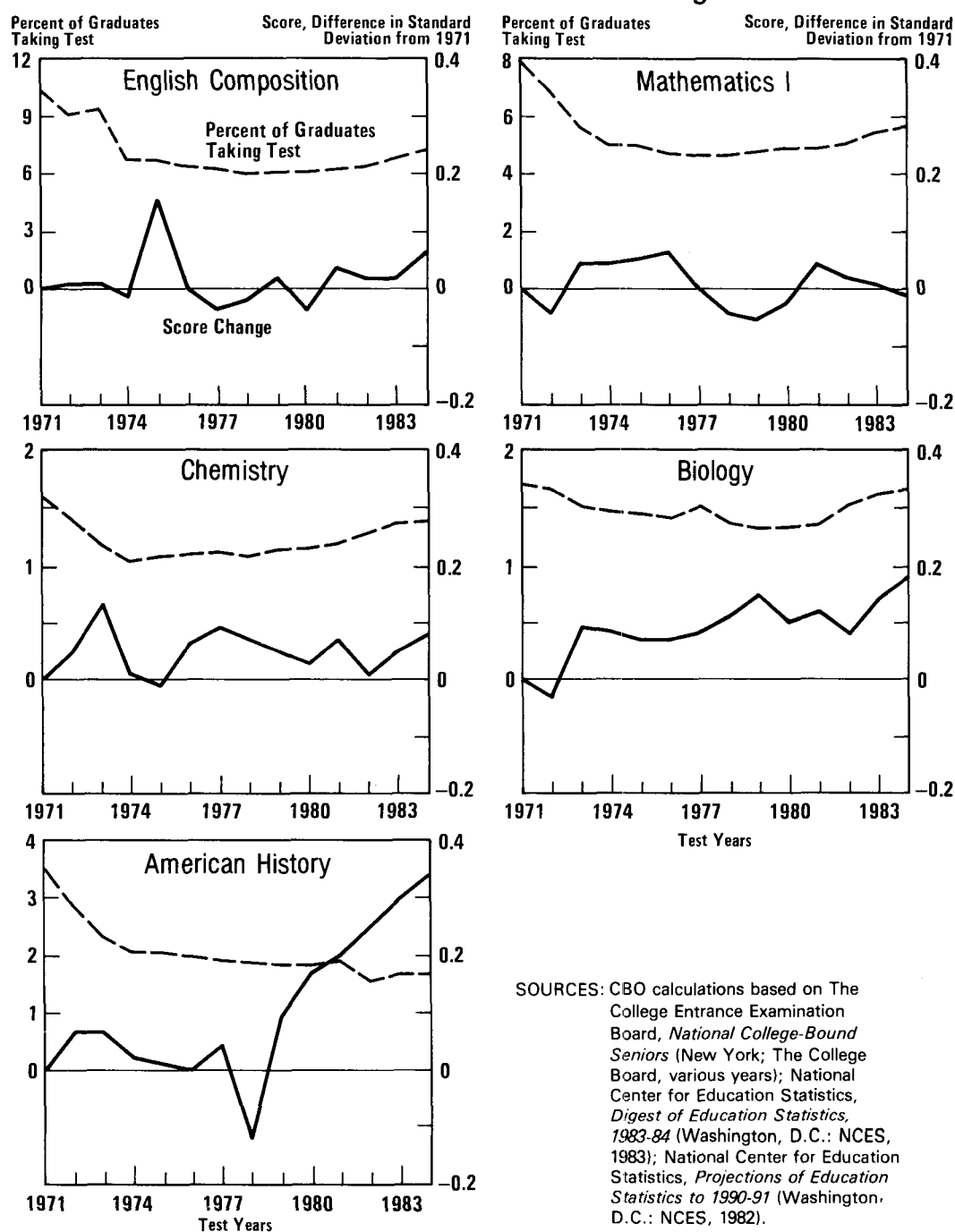
These tests of achievement in specific subject areas are taken by a small fraction of 1 percent to about 10 percent of graduates, depending on the subject area and year. Typically, they showed stability or slight increases during the last half of the period of declining achievement, but this might merely reflect a rapid drop in the proportion of graduates taking the tests (see Figure D-4). 23/ That is, if the declining proportion of graduates taking

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22. F. Joe Crosswhite, John A. Dossey, Jane O. Swafford, Curtis C. McKnight, Thomas J. Cooney, and Kenneth J. Travers, *Second International Mathematics Study: Summary Report for the United States* (Champaign, Illinois: Stipes Publishing Co., 1985), pp. 63, 70-73. Details of the earlier assessment can be found in Torsten Husen, ed., *International Study of Achievement in Mathematics: A Comparison of Twelve Countries* (Stockholm and New York: Almqvist & Wiksell and John Wiley & Sons, 1967).
 23. Because of scaling, the drop in the proportion of students taking the achievement tests is more marked than it might seem in Figure D-4. For example, the proportion of students taking the biology test dropped by about 22 percent between 1971 and 1979, but that decline appears moderate in Figure D-4.

Test score data are from College Board, *National College-Bound Seniors*, various years. Comparable data on scores and participation rates are unavailable before the 1971 school year. Participation rates are obtained by the dividing the number of test takers in a given year by the number of high-school graduates in that year in *Projections of Education Statistics to 1990-91*, (Washington, D.C.: National Center for Education Statistics, 1982). This produces a slight overestimate of the proportion of graduates taking the test, because some students take the test in their junior year and repeat it the following year. More important, it overstates the selectivity of the tests in areas in which the SAT and the Achievement Tests are heavily used. It adds to the denominator students in areas where few students take these tests (for example, areas in which the ACT is the dominant college-entrance test).

Figure D-4.

ETS/CEEB Scores and Percent of Graduates Taking Test



the tests reflects a drop in the number of less able students taking the tests, the resulting increase in the ability level of the remaining group taking the tests might have masked a decline within ability groups. For example, the proportion of graduates taking the English composition test dropped roughly from 10 to 6 percent between the 1971 and 1978 school years, and similar declines in participation occurred in other subject areas as well.

Conversely, the relative stability of many of the College Board achievement test scores since 1979 might hide a substantial increase in achievement within ability groups. Since 1979, average scores on the more common College Board achievement tests have generally held stable or increased modestly in the face of moderate-to-large increases in the proportion of students tested. (American History is an exception; it showed a large increase in average scores but a slight decrease in participation.)

The College Board's Advanced Placement Tests

Average scores on this set of tests--taken by college-bound students seeking college credit for advanced coursework in high school--has remained stable since 1969. This stability, however, might mask a sizable increase in educational accomplishment.

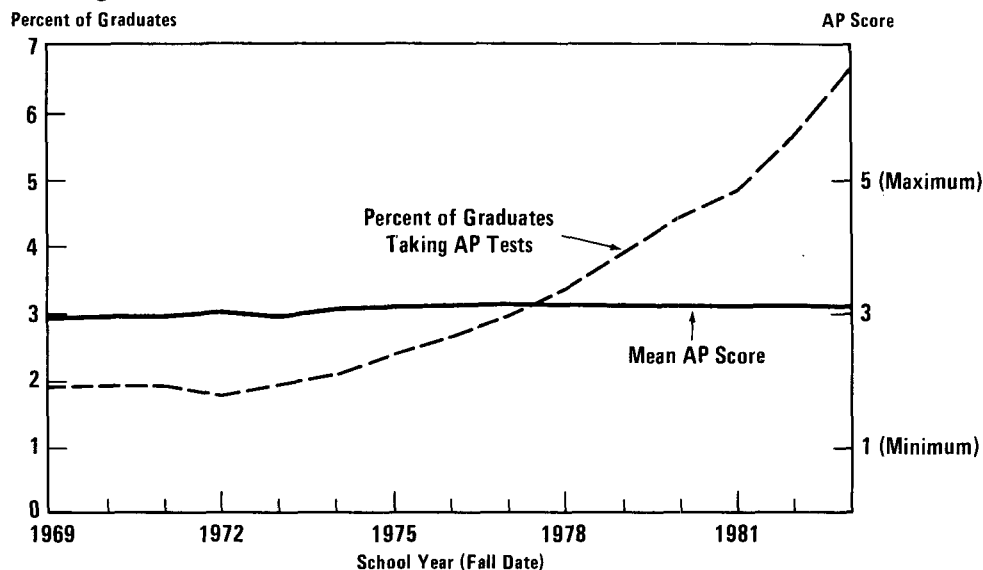
Relatively few graduates take each of the Advanced Placement (AP) tests, but the total proportion taking any of them has roughly tripled--from under 2 percent to about 6 percent--over the past decade.^{24/} During this decade of rapid growth--as well as the preceding half-decade of fairly stable test volume--the average score on AP tests in all subjects remained quite stable, increasing about 5 percent (see Figure D-5).

The rapid growth in the proportion of seniors taking the AP tests need not indicate the sort of compositional changes that affected the SAT in the 1960s, and the stability of AP scores accordingly should be interpreted differently. In the case of the SAT, the growth in the proportion of students taking the test in part indicated an increase in the proportion of test takers from lower-ability groups. In such a situation, a stable overall average score would indicate increasing achievement within ability groups. In the

24. Data are from published and unpublished College Board tabulations. These proportions are subject to the same caveats as are described above with respect to the College Board achievement tests.

Figure D-5.

Average Advanced Placement Scores and Percent of Graduates Taking Tests



SOURCES: CBO calculations based on Advanced Placement Program of the College Board, *Advanced Placement Yearbook, 1984* (New York: The College Board, 1984), and unpublished tabulations; National Center for Education Statistics, *Digest of Education Statistics, 1983-84* (Washington, D.C.: NCES, 1983); National Center for Education Statistics, *Projections of Education Statistics to 1990-91* (Washington, D.C.: NCES, 1982).

case of the AP tests, however, much of the growth in volume reflects the expansion of the AP program into additional geographic areas, as additional universities decided to offer credit for AP tests and more school districts and individual schools decided to offer advance courses preparing students for the AP tests. For example, the decision of some large state universities to offer AP courses contributed substantially to the growth of the AP program, and students going to such universities--such as the University of California, the University of North Carolina, and the State University of New York--now account for a large share of the total number of AP examinations.^{25/} Thus, the growing proportion of students taking AP exams might be lowering the average ability of the test-taking group, but

25. College Entrance Examination Board, unpublished tabulations; and Harlan Hanson, The College Board, personal communication, March 1985.

probably far less than did the growth of the SAT pool two decades ago. While some of the new students added to the AP pool might be lower in ability than those in the smaller pool a decade ago--when more selective schools contributed a greater share of the students--many are probably comparable in ability, differing only in geographic location or family income.

The constancy of AP scores in the face of rapid growth in the number of test-takers accordingly can be seen as an increase in educational accomplishment. To the extent that the average ability of the pool might have decreased, the stable scores reflect an increase in the scores obtained by students at any given ability level. To the extent that additional students of comparable ability have been drawn into the program, the program's growth represents a dramatic increase in the advanced-level coursework of highly able students--that is, it can be seen as a growth in their educational attainment.

CONCLUSION

Taken together, the available data provide only spotty and inconsistent suggestions that achievement trends have been relatively more favorable in some achievement subgroups than in others. There are some indications of relative gains at both ends of the achievement scale--that is, among students in the lowest quartile and among certain select students. These signs, however, appear limited to certain tests. In addition, if these relative gains are not an artifact of certain aspects of those particular tests, some apparently might be confined to relatively short periods.

Indeed, the data suggest that generalizations about relative gains in various achievement subgroups are risky, and that inferences for educational policy might not be warranted. The variation in trends from one data source to another--and even from one tabulation to another of a single data source--appears more striking than any generalizations about relative trends among achievement subgroups. The uncertainty engendered by this variability is exacerbated by the many gaps in the available data and by technical problems entailed in using the data in their current form to draw conclusions about achievement subgroups.

APPENDIX E

DIFFERENCES IN ACHIEVEMENT TRENDS AMONG BLACK, HISPANIC, AND NONMINORITY STUDENTS

Evidence that the average scores of black and Hispanic students have risen relative to those of nonminority students--but remain well below them--is summarized in Chapter IV. Because that conclusion has considerable importance, the evidence underlying it is presented in more detail in this appendix. ^{1/}

BLACK STUDENTS

Although data on differences in achievement between black and non-minority students at any one time are abundant, data sources showing relative trends in achievement in those two groups are surprisingly rare. In the course of this study, nine data sources with separate trend data for black and nonminority students were located. Two are nationally representative: the National Assessment of Educational Progress (NAEP), and a comparison of the National Longitudinal Study of the High School Senior Class of 1972 (NLS) and the High School and Beyond study (HSB).^{2/} Two others are national but unrepresentative: the Scholastic Aptitude Test (SAT) and American College Testing Program (ACT) tests. Data are also available from two statewide assessments (North Carolina and Texas) and three local districts (Houston, Texas; Cleveland, Ohio; and Montgomery County, Maryland).

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1. For an explanation of the ethnic classifications used in this paper, see Chapter IV. The classifications used in the data sources cited here are not entirely consistent. In each case, the scores of black students have been compared with the group which comes closest to being "nonminority"--that is, the group that excludes the largest share of identified minority groups. This nonminority group, however, varies among data sources. The SAT "white" category, for example, specifically excludes Asian Americans, native Americans, Puerto Ricans, and Mexican Americans. In contrast, the closest comparable category in the NLS/HSB comparison combines non-Hispanic whites with Asian-American and native American students.
 2. Donald A. Rock, Ruth B. Ekstrom, Margaret E. Goertz, Thomas L. Hilton, and Judith Pollack, *Factors Associated with Decline of Test Scores of High School Seniors, 1972-1980* (Washington, D.C.: Center for Statistics, U.S. Department of Education, 1985).

Eight of these nine data sources showed a consistent and unambiguous narrowing of the gap between black and nonminority students, leaving little doubt that this pattern is real and not an artifact of some aspects of the tests or groups tested. The one partial exception is the ACT. That test did show a small narrowing of the gap, but the evidence is somewhat questionable because of inconsistencies among subject areas and large year-to-year fluctuations. While the reasons for that one partial anomaly are not clear (several possible explanations are discussed below), it is not sufficient to call the convergence of scores on all of the other eight tests into serious doubt. The consistency among the other eight tests is particularly persuasive in the light of the variation in grade levels, test characteristics, and student characteristics from one test to another.

This convergence in the scores of black and nonminority students appears to have three components. The scores of black students:

- o Declined less than those of nonminority students during the later years of the general decline;
- o Stopped declining, or began increasing again, earlier; and
- o Rose at a faster rate after the general upturn in achievement began.

These specific conclusions, however, are less certain than is the overall convergence between the two groups, for not all are apparent in all eight of the data sources.

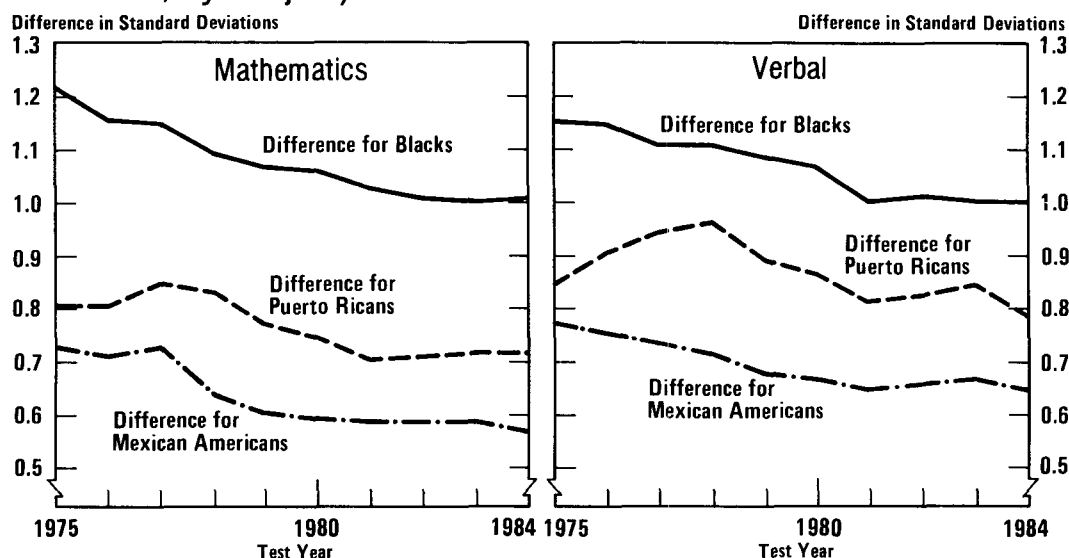
The SAT

Since 1975, black students have gained relative to nonminority students on both scales of the SAT (see Figure E-1)--a trend that ended with the 1981 and 1983 school years (on the verbal and mathematics scales, respectively). During the late 1970s, while nonminority students continued to lose ground, black students improved their scores on the mathematics scale and held about constant on the verbal scale. During the first years of the overall upturn in scores, blacks gained more rapidly than nonminority students.

Both the size of the gap and the rate at which it has been shrinking can be gauged by comparing the average SAT scores of black students with the distribution of scores of nonminority students. In 1975, the average black student's score corresponded roughly to the 11th and 12th percentiles among nonminority students on the mathematics and verbal scales,

Figure E-1.

Minority/Nonminority Differences on the SAT (In standard deviations, by subject)



SOURCES: CBO calculations based on "College Board Data Show Class of '85 Doing Better on SAT, Other Measures of Educational Attainment" (press release, The College Board, 1985), and Solomon Arbeiter, *Profiles, College-Bound Seniors, 1984* (New York: The College Board, 1984).

NOTE: Plotted points are the differences in standard deviations between the mean score of each group and the mean score of nonminority students.

respectively. In 1984, the average black scores had risen to about the 16th percentile among nonminority scores on both scales.^{3/} While this change might appear slight, the annual rate of change is in fact roughly comparable to the average rate of the total SAT decline--a trend that few would label insignificant.^{4/}

3. These estimates are based on nonminority (white) within-group standard deviations in 1983-1984 reported in Solomon Arbeiter, *Profiles, College-Bound Seniors, 1984* (New York: The College Board, 1984), p. 81. Although the within-group standard deviation is technically the appropriate index in a comparison of this sort, using the more commonly available total standard deviation does not substantially alter the results. Moreover, the standard deviations of most tests have changed only very slowly, so the choice of a year from which to take a standard deviation is largely immaterial.
4. During the total period of decline, average SAT verbal and mathematics scores declined at annual rates of 0.028 and 0.016 standard deviations per year, respectively. During the past nine years (the only period for which data are available), the gap between black and nonminority students has shrunk at annual rates of 0.017 and 0.023 standard deviations per year on the verbal and mathematics scales, respectively (based on 1983-1984 standard deviations in the total SAT sample).

The ACT

Black students have gained relative to others on the ACT composite scale since 1970, but that gain has been small and is overshadowed by large year-to-year fluctuations in the size of the gap (see Figure E-2). In addition, the trend has been inconsistent from one subject area to another. The gaps appear to have narrowed in Social Studies and English, for example, while widening in mathematics. ^{5/}

These anomalous patterns on the ACT have a number of possible explanations. For example, the year-to-year instability of the trends might reflect fluctuations in the sample (10 percent of all those taking the test). The relatively small change in the gap over the total time period might in part reflect the nonrepresentative group of students taking the ACT. It might also reflect the fact that in this case the comparison is with all non-black students--a group that includes, for example, Hispanic students and a small number of Asian and native American students. Since Hispanics appear also to have been gaining on nonminority students, trends in this nonblack group might have been slightly more favorable than among non-minority students, leading to a slight understatement of the relative gains of black students.

The NLS and HSB

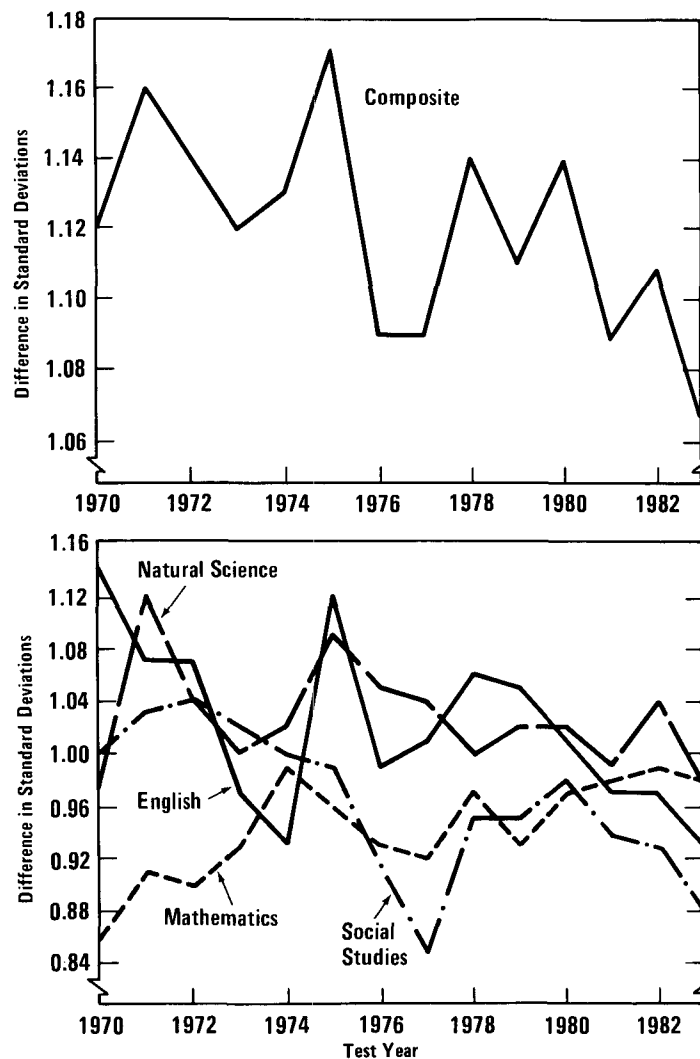
The narrowing of the gap between black and nonminority students is apparent also in the nationally representative comparison of the graduating classes of 1972 and 1980 (school years 1971 and 1979) based on the NLS and HSB studies. ^{6/} In this instance, however, as in the case of the ACT, the trends are clouded by the inclusion of several minority groups in the same category as nonminority students. In all three subjects tested--reading,

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5. Many ACT tabulations provide the scores of black students and all students, but not those of nonblack students. If the scores of all students are used as a comparison instead of those of nonblack students, the gap appears--spuriously--to have been shrinking a bit faster than these figures suggest. The reason for the discrepancy is that an increase in the proportion of black students (in the particular sample used) during the late 1970s and early 1980s lowered the scores of the total group relative to the nonblack group.

The ACT data in Figures E-2 were calculated using the 1977 total-sample standard deviations. Using more recent standard deviations does not alter the results appreciably, and substituting within-group nonblack standard deviations should have only a small effect.

6. Donald A. Rock and others, *Factors Associated with Test Score Decline*.

Figure E-2.
Black/Nonblack
Differences on the
ACT (In standard
deviations, by
subject)



SOURCES: CBO calculations based on: American College Testing Program, unpublished and undated tabulations; American College Testing Program, "Overview of Selected Results" (ACT, unpublished and undated material); Jackie Woods, ACT, personal communication, December 1985.

vocabulary, and mathematics--the largest average declines occurred among a group comprising non-Hispanic whites, Asians, and American Indians (but dominated by the far more numerous non-Hispanic whites.) Trends among black students ranged from a small gain in mathematics to a larger but modest decline in reading (see Table E-1). ^{7/}

7. None of these changes in the average scores of black students was statistically significantly different from no change. See Rock and others, *Factors Associated with Test Score Decline*, Tables D-1, D-2, and D-3.